Teawon Han | Curriculum Vitae

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Education

Academic Qualifications

- **Ohio State University** — **Columbus, OH, United States**
  Ph.D., Electrical and Computer Engineering, Research Assistant — *August 2017– Dec. 2020 (expected)*
  - Advisor: Prof. Umit Ozguner
  - Evolving Intelligent Control System for Automotive
- **University of Southern California (USC)** — **Los Angeles, CA, United States**
  Master of Science, Computer Science — *August 2010–May 2012*
  - Advisor: Prof. Paul Rosenbloom and Prof. Wei-Min Shen
  - Artificial Intelligence and Robotics
- **Hallym University** — **Chuncheon-si, Gangwon-do, South Korea**
  Bachelor of Engineering, Computer Engineering — *March 2002–February 2006*
  - Advisor: Prof. Young-Woong Ko
  - Embedded System

Research Experiences in Academic Projects

- **Controls and Intelligent Transportation Research Lab** — **Center for Automotive Research, OSU**
  Graduate Research Associate — *August 2017–Current*
  - Advisor: Professor Umit Ozguner
  - Developed an online evolving method which makes optimal decisions under unexpected situations via own or shared experiences.
  - Studying an online evolving framework to obtain an optimal driving policy in an iterative manner for Automated Vehicle (AV).
    - Project is funded by the Ford Motor Company's University Research Program (URP)
    - Researching with Dr. Dimitar Filev and Dr. Subramanya Nageshrao from the Ford Motor Company (August 2019 - Now).
  - Publication1: Driving Intention Recognition and Lane Change Prediction on the Highway, IV 2019
  - Publication2: An Online Evolving Framework for Advancing Reinforcement-Learning based Automated Vehicle Control, IFAC 2020 21th World Congress (Accepted)
  - Posted Paper: An Online Evolving Framework for Modeling the Safe Autonomous Vehicle Control System via Online Recognition of Latent Risks, arXiv
- **Polymorphic Robotics Laboratory** — **Information Sciences Institute (ISI) of USC**
  Directed Research Student — *January 2012–July 2012*
  - Advisor: Professor Wei-Min Shen
  - Researched and developed an optimal algorithm that makes a reconfigurable robot (called SuperBot) to choose the best shape and gait autonomously based on different environments [link].
  - Publication: An online gait adaptation with SuperBot in sloped terrain, ROBIO 2012
- **Cognitive Architecture Lab** — **Institute for Creative Technologies (ICT) of USC**
  Directed Research Student — *May 2011–January 2012*
  - Advisor: Professor Paul S. Rosenbloom
  - Contributed to improve the Graphical Cognitive Architecture (GCA)'s learning and reasoning systems.
  - Developed a logical GCA structure for mobile robot's localization and navigation.
  - Publications:
    - Fusing Symbolic and Decision-Theoretic Problem Solving+Perception in a Graphical Cognitive Architecture, BICA 2011.
    - Learning via gradient descent in Sigma, ICCM 2013.

Computational Neuro-Rehabilitation & Learning Lab **USC**
Directed Research Student *January 2011–May 2011*

- Advisor: Professor Scheweighofer Nicolas
- Researched and developed the learning and reasoning system to improve efficiency of rehabilitation processes.
- Developed an intelligent system by using the Bayesian Logistic Regression model, which can recognize and predict patient's current and future rehabilitation statuses.

Previous Employment

Robot Development Group, New Business Division, **HANWHA AEROSPACE**
Research Engineer *July 2015–May 2017*

Hanwha Group acquired Samsung Techwin to expand their defense & security business. Indeed, Hanwha Group became the top ranked defense company in South Korea.

- Project: Unmanned Aerial Vehicle (UAV) Autonomous Flight System
  - Researched a framework of UAV control system for cognition of environmental conditions and optimal controls given missions (e.g., searching and tracking target objects, creating an aerial map).
  - Designed the system configuration for UAV's autonomous flight (using Pixhawk and Raspberry Pi).
  - Developed a system to create an aerial map by using UAV and a single camera.
  - Demonstration of prototype UAV control system [link]

Robot Technology Group, Advanced Technology Institute **SAMSUNG TECHWIN**
Research Engineer (Unmanned Autonomous Driving System Team) *August 2012–June 2015*

- Project: Autonomous Driving Car (platform: QM5 made by Renault Samsung Motors)
  - Developed lane and curb detection systems: the Artificial Neural Networks is trained to detect $lane\ features$ under various conditions (camera and laser sensors are used for collecting data).
  - Developed the localization system which can revise GPS positions in real time by detecting sensor's errors.
    - The errors are measured by analyzing detected lanes and given map.
  - Publications:
    - Lane detection & localization for UGV in urban environment, ITSC 2014
    - Demonstrated by using developed autonomous driving car [link]
    - A New Quadtree Data Structure for Mobile Robot Mapping Problem in a Large Scale Area, ICROS 2013
- Project: Off-Road Unmanned Ground Vehicle (UGV) [link] for surveillance and reconnaissance operations.
  - Developed the object detection system and the traversability mapper by using 3D LIDAR and IMU sensors.
  - Demonstration 1 [link], Demonstration 2 [link]
- Project: Indoor UGV for factory automation
  - Developed the indoor localization system which recognizes accurate positions without GPS by using stereo camera. (Advanced version), Demonstration [link]
  - Developed a line-tracing system by using a single camera (Standard version), Demonstration [link]
- Patents
  - Device and method for correcting vehicle position, system for correcting vehicle position by using lane and vehicle capable of manless operation (PCT/KR2014/004299).
  - Lane detection system and method (US 9245188 B2).
- Other Experiences
  - Developed device drivers for sensors under the necessity using Serial and Ethernet protocols.
  - Development Environment: ROS and C++ on Linux
  - Sensors: GPS/INS (Span-CPT, VN-200), camera (Flea), laser sensor (LMS-151, LMS-511, LD-MRS), LIDAR (Velodyne 64E, 16), Kinect, Tigereyes
  - Designed and created robot's mechanism parts by using Solidworks and 3D printer.

Other Experiences

- **65Div. 186R 2BN** — **The Republic of Korea Army**
  First Lieutenant, Secure Information Officer and Platoon Leader — *March 2006–June 2008*
  - Led and counseled 40 soldiers for training combat-strategies and executing missions.
  - Operated the "military tactic-command and information system".
  - Managed confidential documents.
- **Reserved Officers' Training Corps (ROTC)** — **Hallym University**
  Staff member of cadets — *March 2005–Nov. 2005*
  - Managed and counseled 24 cadets in military classes and training.
  - Prepared military training and made an annual plan.

Publications

- Han, T., Filev, D., & Ozguner, U. (2020). An Online Evolving Framework for Advancing Reinforcement-Learning based Automated Vehicle Control. 21st International Federation of Automatic Control World Congress (Accepted).
- Han, T., Filev, D., & Ozguner, U. (2019). An Online Evolving Framework for Modeling the Safe Autonomous Vehicle Control System via Online Recognition of Latent Risks. arXiv preprint arXiv:1908.10823.
- Han, T., Jing, J., & Özgüner, Ü. (2019, June). Driving Intention Recognition and Lane Change Prediction on the Highway. In 2019 IEEE Intelligent Vehicles Symposium (IV) (pp. 957-962). IEEE.
- Han, T., Kim, Y., & Kim, K. (2014, October). "Lane detection & localization for UGV in urban environment". In 17th International IEEE Conference on Intelligent Transportation Systems (ITSC) (pp. 590-596). IEEE.
- Kim, D., & Han, T. (2013). "A New Quadtree Data Structure for Mobile Robot Mapping Problem in a Large Scale Area". Institute of Control, Robotics, and System 2013, 294-295.
- Rosenbloom, P. S., Demski, A., Han, T.& Ustun, V. (2013). "Learning via gradient descent in Sigma". In Proceedings of the 12th International Conference on Cognitive Modeling (Vol. 94).
- Han, T., Ranasinghe, N., Barrios, L., & Shen, W. M. (2012, December). "An online gait adaptation with superbot in sloped terrains". In 2012 IEEE International Conference on Robotics and Biomimetics (ROBIO) (pp. 1256-1261). IEEE.
- Chen, J., Demski, A., Han, T., Morency, L. P., Pynadath, D. V., Rafidi, N., & Rosenbloom, P. S. (2011, October). "Fusing Symbolic and Decision-Theoretic Problem Solving+ Perception in a Graphical Cognitive Architecture". In BICA (pp. 64-72).

Technical and Personal skills

- **Programming Languages:**
  - Proficient in: C, PHP, C++, Matlab, Python, Tensorflow, TeX, ROS, OpenAI Gym, Sumo.
- **Industry Software Skills:** SolidWorks (Advanced), Most Microsoft Office products (Advanced).
- **General Business Skills:** Good presentation skills, Works well within a team.
- **Interests:**
  - Artificial Intelligence, Machine Learning, Robotics, Computer Vision, Multi-agents System (Intelligent Collaboration), Unmanned Ground/Aerial Vehicle System.